

Opportunity Corridor

Final

Step 7 Storm Water Summary

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1.0 Introduction

Opportunity Corridor is proposed as an access boulevard for University Circle to the Interstate System, in Cleveland, Ohio. The proposed project consists of a new alignment and improvements of existing facilities to provide a link between the existing I-490 stub at E. 55th Street and the local roadway network near University Circle. The project study area has been divided into Western, Central, and Eastern sections so that local features can be shown in sufficient detail on the attached figures. This report addresses storm water drainage issues related to the Ohio Department of Transportation (ODOT) Step 7 level design items and is a supplement to a Step 6 report entitled “Opportunity Corridor, Cuyahoga County, Ohio; Conceptual Drainage Design; PID 77333” prepared by Michael Baker Jr., Inc. and dated August, 2012 (Baker, 2012). This report also supplements storm water information presented in the Step 5 report entitled “Opportunity Corridor Step 5 Storm Water Summary” prepared by URS and dated July 15, 2010 (Step 5 Report) (URS, 2010); and the Step 6 report entitled “Opportunity Corridor Final Step 6 Storm Water Summary” dated October 4, 2011 (Step 6 Report) (URS, 2011).

The existing surface water drainage system within the project study area discharges entirely to a portion of the combined sewer system maintained in part by both the North East Ohio Regional Sewer District (NEORSD) and the Cleveland Division of Water Pollution Control (Cleveland WPC). The project study area to the west of Buckeye Road is a portion of the NEORSD Southerly wastewater treatment plant (WWTP) combined collection system that includes the NEORSD combined sewer overflow outfalls (CSO outfalls) on the Cuyahoga River; and the project study area to the east of Buckeye Road is a portion of the NEORSD Easterly WWTP combined sewer collection system that includes NEORSD CSO outfalls on Doan Brook and Lake Erie. The Cleveland WPC is responsible for the network of collection sewers conveying sanitary sewage and storm water in the City of Cleveland from their point of origin to the NEORSD interceptors. The Cleveland WPC is charged with managing and supervising matters relating to the elimination, control, and regulation of water pollution within the city limits. The City of Cleveland currently requires redeveloped properties to control their storm water quantity through the use of detention facilities and will explore various options to add water quality measures to the detention requirements.

This report summarizes pertinent sections of the Step 5 and 6 Reports and presents new information and calculations related to the final alignment that is being analyzed in Step 7. This report also describes how this alignment will separate storm water runoff from the local CSO system and utilize potential green infrastructure areas to satisfy Ohio Environmental Protection Agency (Ohio EPA) and City of Cleveland requirements.

2.0 Project Area System Components

2.1 Northeast Ohio Regional Sewer District System

Combined sewers carry sanitary waste, industrial waste, and storm water runoff in a single pipe. Combined sewers are designed to allow normal, dry weather flow to go to a

wastewater treatment plant; however, storm water runoff can dramatically increase the volume of water flowing into and through the combined sewers to the treatment plant. Regulator control devices within the combined sewer system allow some of the combined flow to be diverted, receive no treatment, and discharge (overflow) into area waterways or Lake Erie to prevent the system capacity of the wastewater treatment plants (WWTP) from being exceeded and to minimize basement backups into residential homes. The points of discharge of the diverted combined flow are the NEORSD CSO outfalls.

The sewershed areas for each of the NEORSD CSO outfalls are labeled and identified by a unique transparent overlay color on the figures in this report and were provided by the NEORSD GIS Department. The limits of these CSO outfall sewersheds show the contributing areas to each CSO outfall. It is understood that a portion of the combined flow from these sewersheds may be directed outside of the sewershed boundaries to other CSO outfalls during periods of combined wet weather flow as controlled by the diversion structures in the NEORSD system regulators. It should also be noted that some of the combined system pipes overlap along the perimeters of these sewersheds. The sewershed boundaries are controlled by the CSO system components and may not coincide with any storm water only drainage areas that may exist and that are controlled by the ground surface topography.

The NEORSD combined sewer system regulators control the diversion of combined sanitary sewer and storm water flows during periods of wet weather. The location of the NEORSD regulators are delineated by a green triangle on the figures included in this report. The regulators within the project area that are a part of the Southerly WWTP system (labeled with a “S” prefix on the regulator ID) direct combined sanitary and storm water overflows to CSO outfalls CSO-039 and CSO-040 located along the Cuyahoga River to the west of the project. The regulators within the project area within the Easterly WWTP system (to the east of Buckeye Road) (labeled with a “DV” prefix on the regulator ID) direct combined overflows to CSO outfalls located in the Doan Brook valley (CSO-222 and CSO-223). A portion of the central of the project area is served by the sewersheds for CSO outfalls that drain into Lake Erie (CSO-202, CSO-203, and CSO-204).

The project area is also served by a NEORSD interceptor network that directs storm water and wastewater to the Southerly and Easterly WWTPs. The majority of these interceptors are greater than 4 feet in diameter and many were constructed in deep tunnels with manhole depths that range from 20 feet to over several hundred feet. The NEORSD interceptors are delineated by a solid red line on the figures of this report. The diameter of the interceptor is labeled on the attached figures in locations where the information is available. A “0” inch diameter indicates that the diameter information was not available on the combined sewer system GIS information or the system plans obtained from the NEORSD. It should be noted that many of the interceptors are relatively old and have irregular shapes and that the diameter listed represents the maximum dimension of the interceptor.

The Kingsbury Run system flows in a northwesterly direction towards the project area and is an enclosed “captured stream” and enters the project area along the south between Berwick Road and East 64th Street (see the Figures for the Western portion of the project). Kingsbury

Run is a NEORSD system that receives combined system overflows and ultimately discharges to the Cuyahoga River to the west of the project area via CSO outfall CSO-040.

Doan Brook is an enclosed “captured stream” that lies immediately outside the project area to the east in Amber Park and Rockefeller Park between Stokes Boulevard and Martin Luther King Boulevard. Doan Brook flows northward underneath the RTA tracks, daylight in Rockefeller Park, and ultimately discharges into Lake Erie. Multiple NEORSD CSO outfalls discharge combined flow into the enclosed section of Doan Brook near the project area before it daylight on the surface downstream in Rockefeller Park.

2.1.2 NEORSD Long Term Control Plan

Under the Clean Water Act, the NEORSD is required to plan, design, and construct a Long Term Control Plan (LTCP) based upon a Combined Sewer Overflow Control Strategy (CSOCS), which is estimated to cost \$1.6 billion dollars and consists of 65 projects, including adding 103 miles of additional pipes and tunnels, above and below ground storage, pump stations, and WWTP upgrades (NEORSD, 2005). Some projects will be connecting sewers and other projects will be separating storm sewers from the combined system. The goal of CSOCS is to dramatically reduce the frequency and volume of combined sewer overflows into surrounding water bodies. The NEORSD has estimated that it will take an estimated 30 years to complete the design and construction of the 65 projects. The Step 5 Report (URS, 2010) summarizes the CSOCS information for the CSOs that have a portion of their sewershed within the project study area. The project goal of separating project storm water runoff generated by this project from contributing to the NEORSD combined sewer system is prompted by both a desire of the local stakeholders to have the project include green infrastructure areas to treat a portion of the project storm water, but also to have the project incorporate the NEORSD goals of reducing CSO overflows by reducing the surface area contributing to CSO sewershed areas. Figure 1 shows the components of the LTCP in the study area (Figure 1 was provided by the NEORSD subsequent to the preparation of the Step 5 Report).

2.1.3 NEORSD Green Infrastructure Feasibility Study

The NEORSD is currently in the process of the implementing a Green Infrastructure Feasibility Plan intended to reduce storm water runoff volume contributions to the CSO system throughout the NEORSD service area. Areas within the NEORSD service area sewersheds are being identified where green infrastructure projects could be implemented to reduce storm water runoff, promote infiltration, and reduce contributions to the CSO system. Two areas within or near the project study area have been identified as areas that would be feasible for the implementation of green infrastructure projects:

- 1.) An area surrounding E. 75th Street and 80th Street that is bounded by the RTA tracks on the north, west, and south’ and the Norfolk Southern railroad tracks on the east; and
- 2.) An area to the south of Francis Avenue and bounded on the west by 61st Street and on the east by 67th Street

The NEORSD green infrastructure projects in these areas might have components that include green parking lots, land re-purposing, green storm water storage areas, green streets, separate storm sewer systems, and storm water channels. Opportunities might exist in these areas for collaborative green infrastructure projects with the NEORSD should either of these areas be carried forward through the NEORSD Green Infrastructure Feasibility Plan prioritization process as viable project areas.

Discussions have occurred with the NEORSD staff regarding the potential green infrastructure components of this project and the NEORSD Green Infrastructure Feasibility Plan. Collaboration between green infrastructure components of this project and the projects ultimately identified and constructed by the NEORSD Green Infrastructure Feasibility Plan may be complicated by the different implementation schedules of this project and the NEORSD program.

2.1.4 NEORSD Combined Sewer Code

Development or redevelopment projects within the NEORSD service area must comply with the NEORSD's "Title IV Combined Sewer Code Standard Comments to All Development in Combined Sewer Area" (NEORSD Standards) (see Appendix A). These NEORSD Standards describe the storm water management requirements when proposed development occurs within the NEORSD service area and describes the standards for making connections to a combined sewer system and for separated sewer connections to a CSO pipe or receiving water. In summary, the NEORSD will not authorize "increases in flow at combined sewer overflow (CSO) locations" and "post-development peak flows shall not exceed existing condition peak flows, nor shall they result in an increase to CSO volumes and/or typical year activations."

According to the NEORSD Standards, separated system connections (i.e. connections containing only storm water) to a CSO pipe or receiving water are governed by Cleveland Building Code Chapter 3116 - Construction and Post-Construction Site Storm Water Runoff Control (Chapter 3116)(see Appendix B) or the Ohio EPA Construction General Permit (Ohio EPA, 2008) whichever is more restrictive. Both the NEORSD Standards and Chapter 3116 require development or redevelopment projects to install permanent post-construction BMPs sized to accommodate the Ohio EPA Water Quality Volume.

2.2 City of Cleveland Division of Water Pollution Control System

The smaller local sewers, including combined sewers and storm sewers, are owned and maintained by the Cleveland Division of Water Pollution Control (Cleveland WPC). These local combined sewers capture storm water at the ground and road surface via storm drain inlets. These local sewers transport storm water and wastewater to a combination of NEORSD interceptors, regulators, CSO outfalls, and eventually to the NEORSD WWTPs. The Cleveland WPC local system is shown on the attached figures as a narrow solid orange line with arrows that point in the direction of flow.

The Cleveland WPC is responsible for the network of sewers conveying sanitary sewage, storm water, and industrial waste in the City of Cleveland from their point of origin to the NEORS D interceptors and ultimately the sewage processing facilities for treatment and disposal. The Cleveland WPC maintains, cleans, repairs, and improves the sewers and their associated infrastructure. In areas of combined sewer systems, such as the project area, the jurisdiction of the Cleveland WPC also includes storm water drainage. The Cleveland WPC is also charged with managing and supervising matters relating to the elimination, control and regulation of water pollution within the city limits. Storm water connections are governed by Cleveland Building Code Chapter 3116 - Construction and Post-Construction Site Storm Water Runoff Control (Chapter 3116) (see Appendix B) or the Ohio EPA Construction General Permit (Ohio EPA, 2008)

3.0 ODOT – Post-Construction Best Management Practices

ODOT prepared a Storm Water Management Plan (SWMP) in 2003 to address the Municipal Separate Storm Sewer System (MS4) Permit requirements. The following are the Best Management Practices (BMPs) listed in the SWMP that are viable options (depending upon site conditions and location constraints) for use as Post-Construction BMPs in the Potential Green Infrastructure areas for this project along with a description of the BMP from ODOT's Location and Design Manual, Volume 2 (dated July 2012):

- **Bioretention Cell** – Bioretention Cells consist of depressed low-lying areas that treat storm water through evapotranspiration and filtering through a planting soil. As the storm water passes through the soil it is filtered. An underlying perforated storm sewer or underdrain captures the treated storm water and carries it to an outlet.
- **Infiltration Basin** – An infiltration basin is an open surface pond that uses infiltration into the ground as the release mechanism.
- **Constructed Wetlands** - Constructed Wetlands treat storm water through bio-retention. They are depressed, heavily planted areas that are designed to maintain a dry weather flow depth ranging between 0.5 to 2 feet.
- **Extended Detention or Retention Basin** - Extended Detention captures runoff and slowly releases the captured runoff over a period of time. A Detention Basin is a dry pond that detains storm water runoff for quantity and limited quality control. A Retention Basin is a “wet” pond that has a minimum surface water elevation between storms that is defined as a permanent pool.

Detention basins that capture runoff and slowly release the captured runoff over a period of time would still potentially contribute to increases in storm water runoff volume (and subsequent CSO volumes increases) from the project if the basin outlet is connected to the NEORS D CSO system. Detention basins need to be connected to storm only pipes or other conveyance systems that discharge directly to surface water bodies to avoid volume increases to the CSO system.

4.0 Project Storm Water

4.1 Project Storm Water Drainage Areas and Potential Points of Discharge

The storm water runoff from the final alignment is being analyzed in this Step 7 Report and the drainage areas of the alignment are shown on Figures 2 through 4. The contributing project storm water drainage basins and locations of project storm water discharge were delineated by Michael Baker Jr., Inc. (Baker) and these delineations have been used without revision in this report. Figures 2 through 4 show the drainage areas, flow directions, and the points of discharge for the western, central, and eastern portions of the project respectively.

The project alignment was subdivided by Baker into smaller drainage areas for the purposes of sizing the storm drain system within the road right-of way as per ODOT's design standards. The Baker drainage areas contribute flow to six proposed points of discharge from the project and each of the drainage areas is labeled as contributing storm water runoff to one of these six points of discharge (labeled OC-1 through OC-6 on Figures 2 through 4).

Drainage Area OC-1 on the western end of the project will drain project storm water to a point of connection with an existing manhole in an existing storm drain system within I-490 approximately 350 feet to the west of the project limits (Figure 2).

Drainage Area OC-2 will discharge project storm water runoff to an existing storm manhole on the Kingsbury Run CSO overflow system located near the intersection of Francis Avenue and East 55th Street (Figure 2). This 156" diameter CSO overflow line drains to the west and ultimately connects to another CSO overflow line upstream of CSO-040 on the Cuyahoga River.

Drainage Area OC-3 will drain in a westerly direction toward the Kingsbury Run Valley (Figures 2 and 3). The project storm water runoff will discharge into a storm only line in the Kingsbury Run Valley that ultimately directs flow to CSO-040.

Only two project points of discharge and the contributing drainage areas (OC-4 and OC-5) will remain connected to the NEORSD CSO system; the remaining drainage areas (OC-1, OC-2, OC-3, and OC-6) will be separated from the NEORSD CSO system (Figures 2 through 4). Drainage area OC-4 (which lies within the CSO-204 sewershed area) and OC-5 (which lies within the CSO-222 sewershed area) will direct project storm water in easterly and westerly directions respectively to points of discharge at a manhole into the CSO-222 system near Quincy Road (Figures 3 and 4).

Drainage Area OC-6 located along East 105th Street in the eastern portion of the project (Figures 4) will discharge project storm water runoff to the 8 foot diameter overflow sewer that directs flow north from NEORSD regulator DV-22, located in East 105th Street just north of the project study boundary. This overflow sewer discharges into the Doan Brook storm drain located approximately 1000 feet to the north of the project study area boundary.

Table 1 shows the acreage of the project drainage areas and the proposed point of discharge for each drainage area of the project. Please note that a portion of the project drainage areas lie within areas that are not included in any of the NEORSD CSO sewersheds as delineated by the NEORSD GIS sewershed layer. These areas outside of any sewershed areas are without any of the unique transparent overlay colors that identify and delineate the NEORSD sewersheds on the Figures 2 through 4.

Table 1 – Summary of Project Drainage Areas and Points of Discharge		
Drainage areas		Point of Connection
Area	Acres	
OC-1	3.51	Already Separated to Existing Storm System
OC-2	15.28	Separate to CSO-040 156" Overflow Pipe At Francis Ave
OC-3	58.88	Separate to Kingsbury Run Storm Only Pipe
OC-4	3.41	CSO-222
OC-5	0.53	CSO-222
OC-6	42.22	Separate to Doan Brook
Total: 123.83		

The proposed drainage and points of discharge for the project will remove a combined total of approximately 119.5 acres from NEORSD sewersheds CSO-40, CSO-204, and CSO-222 (Table 2). Although this represents only a small portion of the total NEORSD sewershed areas (a maximum removal percentage of 3.1%), this acreage represents a removal of 94% of the total project.

Table 2 – Drainage Area Removed From NEORSD CSO Sewersheds		
NEORSD CSO Sewershed	NEORSD CSO Sewershed Total Area (ac)	Area Removed By Alignment (ac)
CSO-40	4355	43.4
CSO-222	4940	42.2
CSO-204	1352	33.8
		Total: 119.5

4.2 Green infrastructure Areas

The project drainage plan includes project green infrastructure areas and will remove up to 94% of the contributing drainage areas from the local NEORSD CSO system sewersheds. The overall project drainage plan will reduce the amount of project surface area contributing to the CSO sewershed areas as compared to the existing conditions. The project will utilize two types of green infrastructure areas – bioretention cell areas in the median between the travel lanes plus additional green infrastructure areas in acquired parcels primarily located outside of the typical right-of-way. This will include some combination of ODOT approved

post-construction BMPS such as infiltration basins, constructed wetlands, and extended detention/retention basins.

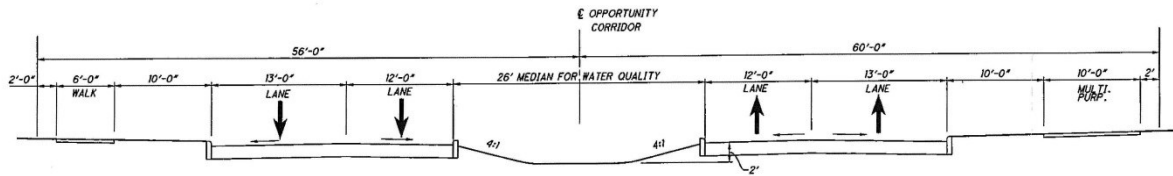
4.3 Median Green Infrastructure Areas

Figures 5 through 7 show areas within the project medians that are proposed to include Green Infrastructure bioretention BMPs. These areas will be bioretention cells with depressed vegetated areas that will treat the quality of the storm water through evapotranspiration and filtering through amended soil layers. The bioretention cells will include an underlying perforated underdrain that will capture the treated project storm water after it filters through vegetation and the amended soil and convey it to a downstream catch basin or connection to a storm drain system.

The typical bioretention median will have a maximum width of 26 feet (see the typical project pavement cross section below) and a maximum 1 foot deep ponding area to capture and store the required water quality volume below the top of a catch basin or riser pipe (as required by ODOT Section 1117.6 of the Location and Design Manual (L & D Manual) (ODOT, 2012)).

4.4 Underground Storage Areas

In addition to Green Infrastructure areas, the project will utilize two underground storage areas to detain the required project water quality volume in locations where above ground area for storage is not available, or where the terrain is elevated above the storm drain system that conveys the project storm water. These two underground storage areas are located on the northern terminus of East 105th Street, and within the quadrant roadway area near E. 55th Street.



Typical Project Pavement Cross Section

The 4:1 (horizontal/vertical) side slopes of the bioretention pond will be 4 feet wide on each side at one foot of depth. The bottom of the bioretention area will be level laterally and will be 18 feet wide. The longitudinal length and slope of the bioretention areas will vary with the roadway slope. Steeper roadway slopes will require the construction of shorter bioretention areas to create a 1 foot deep, level pool of water to promote infiltration. The minimum length to width ratio as specified in Section 1117.6 is 2:1; therefore the minimum length of any bioretention area will be 52 feet for the 26' wide medians. Further design criteria used from Section 1117. 6 are as follows:

1. Do not place where snow may be stored. (Note: this criteria will have to be waived to allow bioretention areas in the project medians although typically plants can be selected that will survive under snow storage areas)
2. Furnish 10 feet or less width between 4 inch underdrain laterals.
3. Furnish a bypass or overflow for the design check discharge. Use a catch basin(s) in conjunction with an overflow weir as needed.
4. Furnish pretreatment of the storm water via vegetation.
5. Ensure the water table or bedrock is below the invert of the bioretention area. (Note: this criteria will have to be field verified in a later step in the ODOT PDP process)
6. Use side slopes of 4:1 (max).

The bioretention cell areas in the median will receive pavement storm water drainage from the inside two 12 foot wide travel lanes through curb cuts in the median curb. The length or frequency (or both) of the median curb cuts will vary with the project roadway slope to allow the contributing pavement storm water runoff to be captured by the depressed vegetated area and infiltrate into the underlying amended soil. Table 3 shows the contributing drainage area acreage of the medians for the project.

Table 3 - Contributing Drainage Areas for Green Infrastructure Areas			
Contributing Drainage areas			
	Total Area	Drainage Area Contributing to Median G. I. Areas	Drainage Area For Additional G.I. Areas
Drainage Area ID	Acres	Acres	Acres
OC-1	3.51	0.0	0.0
OC-2	15.28	0.8	14.48
OC-3	58.88	7.3	51.58
OC-4	3.41	0.0	3.41
OC-5	0.53	0.0	0.53
OC-6	42.22	0.0	42.22

4.3.1 Project ODOT Treatment Requirements

Section 1115.6.2 of the L & D Manual (ODOT, 2012) presents the methodology to calculate the treatment requirements for new construction projects that require the acquisition of new right-of-way (ROW). These calculations are based upon the existing and proposed impervious cover area within the contributing drainage areas. Figures 8 through 10 present the existing and proposed impervious cover areas within drainage areas OC-2 through OC-6. The subbasins within Drainage Area OC-1 were delineated for storm drain system calculations however OC-1 does not lie within the proposed ROW of the project. Section 1115.6 of the L & D Manual states that the entire area within the existing ROW should be considered impervious for these calculations. Table 4 summarizes the existing and proposed impervious areas within each drainage area.

Table 4 - Summary of Drainage Area Percent Impervious			
Drainage Area	Total Area (acres)	Existing Impervious Area (acres)	Proposed Impervious Area (acres)
OC-2	15.28	10.82	15.2
OC-3	58.88	33.86	52.2
OC-4	3.41	0.6	2.41
OC-5	0.53	0.48	0.58
OC-6	42.22	34.21	34.21

Appendix C presents the ODOT calculations sheets used to calculate the Treatment Percentage for each project drainage area. These percentages are then used to reduce the required Water Quality Volume required for each drainage areas as presented in the following sections. Drainage Areas OC-1 is considered to be entirely impervious under both

existing and proposed conditions and therefore is considered a redevelopment area as described in Section 1115.6 of the L & D Manual with a 20% treatment percentage. Table 5 presents these calculated percentages.

Table 5 - Treatment Percentage for Each Project Drainage Area				
Drainage Area	Existing Impervious Area (Aix) (Acres)	New Impervious Area (Ain) (Acres)	Impervious Area (Aix + Ain) (Acres)	T% (decimal)
OC-1	3.5	0.00	3.50	0.2
OC-2	10.82	4.38	15.20	0.43
OC-3	33.86	18.34	52.20	0.48
OC-4	0.6	1.81	2.41	0.80
OC-5	0.48	0.10	0.58	0.34
OC-6	34.21	0.00	34.21	0.2

4.3.2 Median Green Infrastructure Areas Water Quality Calculations

The ODOT Water Quality Volume (WQV) for the median green infrastructure areas has been calculated using the area of the median and the inside two travel lanes of proposed alignment and the treatment percentages shown in Table 5. The NEORS D Title IV Combined Sewer Code Standard Comments to all Development in Combined Sewer Areas (Appendix A) states that “For separated storm connections to a CSO pipe or receiving water, the District will only accept stormwater control measures that provide water quality treatment for 100% of the project area whether the project is defined as a redevelopment project or new development.” Therefore the ODOT WQV prior to the application of the treatment percentages are also presented in the WQV tables in the following sections. The median area WQV calculations are provided in Appendix D and are summarized in Table 6.

Table 6 - Water Quality Volumes for Median Green Infrastructure Areas				
	Total Area	Drainage Area Contributing to Median G. I. Areas	ODOT Water Quality Volume (with Treatment Percentage Applied)	ODOT Water Quality Volume (without Treatment Percentage Applied)
Drainage Area	Acres	Acres	Cubic Feet	Cubic Feet
OC-2	15.28	0.8	772	1,795
OC-3	58.88	7.3	6,596	13,741
OC-4	3.41	0	0	0
OC-5	0.53	0	0	0
OC-6	42.22	0	0	0

4.4 Additional Green Infrastructure Areas

Figures 5 through 7 shows the locations that have been identified as a Potential Green Infrastructure area outside of the right-of-way where above ground Post-Construction BMPs could be constructed for the proposed project that are separate from the median areas. These additional green infrastructure areas will contain Post-Construction BMPs that will include ODOT approved post-construction BMPS such as infiltration basins, constructed wetlands, extended detention/retention basins, or below grade storage. The depth and size of these BMPs will vary depending upon the detailed topography, utility, and other site constraints identified on the parcels in subsequent design phases of the parcel. Further refinement of the areas outside the project right-of-way could take place in later stages of the project development process, as necessary, as local redevelopment plans change and finalize for the project corridor.

Two drainage areas, OC-2 and OC-6, do not have suitable adjacent areas to construct potential above ground green infrastructure BMPs due to topographic, land use, and utility constraints and will require the construction of below ground detention areas to satisfy the water quality volume requirements. In drainage area OC-2 the potential below ground detention area is located within the quadrant roadway area near E. 55th Street (Figure 5). In drainage area OC-6, the potential below ground detention area is located at the northern terminus of the East 105th Street.

It may be possible to get a waiver of the water quality volume requirements for these areas given the overall use of green infrastructure in the project and the reduction in total project area contributing to the CSO sewersheds. A second option might be to provide additional water quality volume retention at other points of project discharge to compensate for these areas.

4.4.1 Additional Green Infrastructure Areas Water Quality Calculations

The water quality volume for the additional green infrastructure areas exclusive of the area contributing to the medians has been calculated for the project alignment. The calculations are provided in Appendix C and are summarized in Table 7. The size of these additional green infrastructure BMPs will vary depending upon site conditions. However according to the Section 1117.5 of the L & D Manual (ODOT, 2012), an ODOT detention basin typically has a full storage depth of 3-6 feet, 4:1 side slopes, and one foot of freeboard required above the Water Quality Volume (WQv).

Table 7 - Water Quality Volumes for Additional Green Infrastructure Areas				
	Total Area	Drainage Area Contributing to Additional G. I. Areas	ODOT Water Quality Volume (with Treatment Percentage Applied)	ODOT Water Quality Volume (without Treatment Percentage Applied)
Drainage Area	Acres	Acres	Cubic Feet	Cubic Feet
OC-2	15.28	14.48	9,100	21,163
OC-3	58.88	51.58	30,326	63,179
OC-4	3.41	3.41	1,165	1,456
OC-5	0.53	0.53	370	1,087
OC-6	42.22	42.22	14,302	71,510

4.4.2 East 55th Quadrant Roadway Location

The quadrant roadway area near E. 55th Street has been identified as an area where a below ground Post-Construction BMP could be constructed for the proposed project separate from the median areas. The quadrant area will receive storm water runoff from Drainage Area OC-2 and will discharge project storm water into an existing storm manhole on the Kingsbury Run CSO overflow system located near the intersection of Francis Avenue and East 55th Street. It is assumed that only a portion of this area will be available for the construction of the Post-Construction BMP. Assuming a 200 foot wide, 200 foot long, 4 foot deep area is available, then approximately 3.7 acre feet (161,720 cubic feet) could be available for potential water quality storage in this area.

4.4.3 Kingsbury Run Discharge Location

Project Drainage Area OC-3 will drain toward a low point at the Kingsbury Run Bridge (Figure 11). Project storm water runoff in the center two lanes of these drainage areas will be directed to the median bioretention areas before discharging into the Kingsbury Run Valley. However, the rest of the project discharge in the remaining lanes and areas of OC-3 will be

conveyed directly to the Kingsbury Run Bridge without treatment of the water quality volume prior to discharge from the right-of-way.

It is proposed that the project drainage from Drainage Area OC-3 be conveyed in a storm drain system to a water quality BMP treatment area located in the Kingsbury Run Valley. Figure 8 shows a preliminary water quality BMP treatment area footprint taking into account topography and the existing utilities present in the valley. This preliminary water quality BMP treatment area is 5.15 acres in size and could have up to approximately 19 acre-feet of potential water quality volume storage using a 5 foot depth (assuming 1 foot of freeboard of the total 6 foot depth) and 4:1 side slopes as stated in the ODOT L & D Manual (ODOT, 2012) for detention areas. This preliminary water quality BMP treatment area would discharge to the existing “storm only” sewer line present in the Kingsbury Run Valley.

4.4.4 East 105th Street Discharge Location

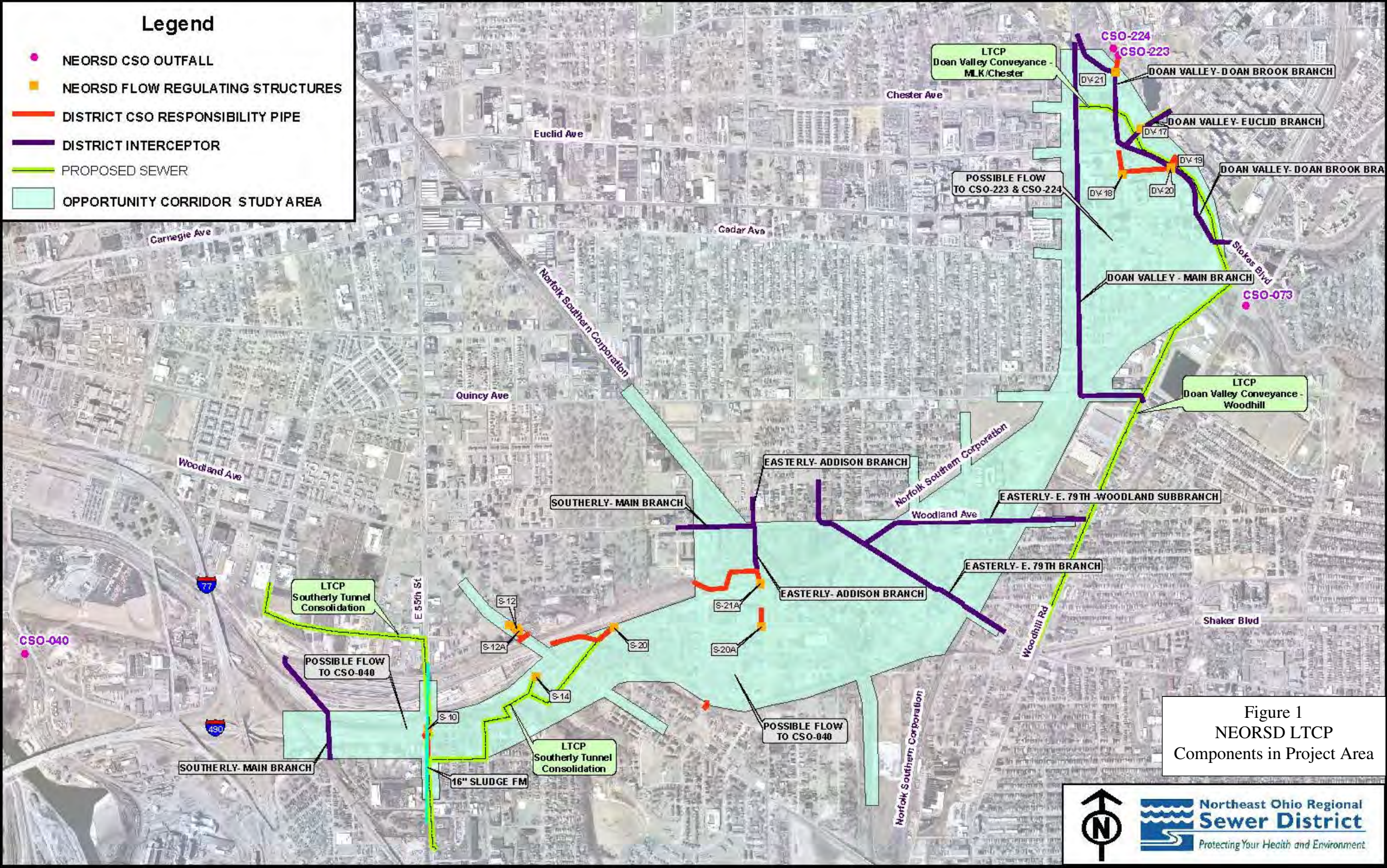
Drainage Area OC-6 located along East 105th Street in the eastern portion of the project (Figures 4 and 7) does not have suitable adjacent areas to construct potential above ground green infrastructure BMPs due to topographic, land use, and utility constraints. This area of the project also will not have median green infrastructure areas due to the same constraints. Treatment of the water quality volume from the project storm water runoff generated in Drainage Area OC-6 may require the construction of a below ground detention area. The location or configuration of this below ground treatment of the project water quality volume has not been identified at this point of the project. This area will require additional surveying and underground utility locational surveys to determine the final location and configuration of the proposed below ground treatment area.

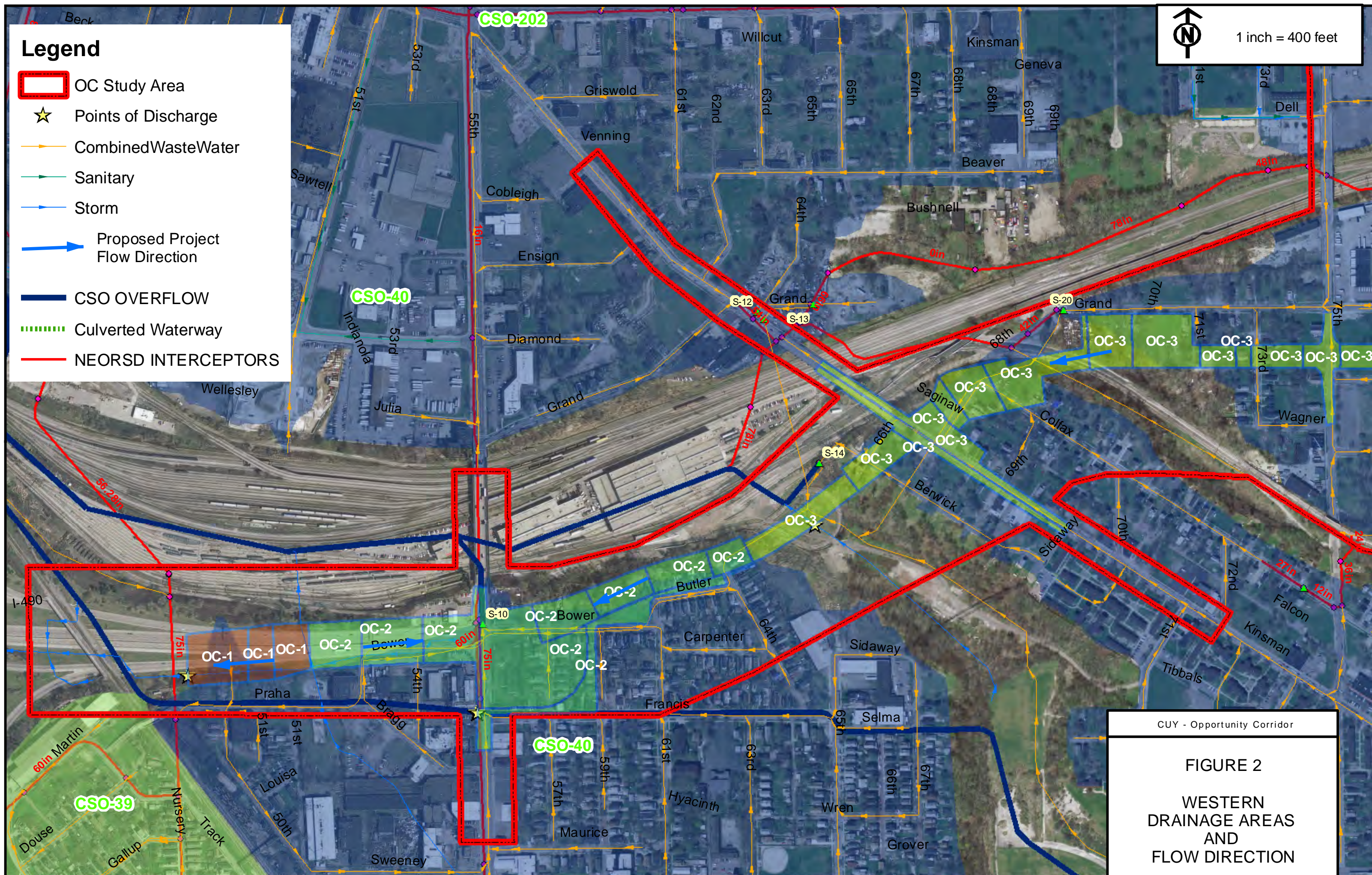
The discharge from any below ground water quality treatment facility located in Drainage Area OC-6 could be connected to the 8 foot diameter overflow sewer that directs flow north from NEORSD regulator DV-22, located in East 105th Street just north of the project study boundary (Figure 12). This overflow sewer discharges into the Doan Brook storm drain located approximately 1000 feet to the north of the project study area boundary. Design plans of NEORSD regulator DV-22 are presented in Appendix D. If a connection to the 8 foot diameter overflow sewer from NEORSD regulator DV-22 should prove infeasible, then a separate “storm only” discharge pipe could be constructed to directly convey project storm water runoff to Doan Brook north of the project.

5.0 References

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- City of Cleveland, 2003. *USEPA Phase II Storm water Management Plan*. March.
- Metcalf and Eddy and CH2M-Hill, 2002a. *Northeast Ohio Regional Sewer District. Easterly CSO Phase II Facilities Plan*, June.
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- NEORSD, 2005. *CSO Facilities Planning Summary Report*. March
- Ohio Department of Transportation, 2003. *Storm water Management Plan*. March.
- Ohio Department of Transportation, 2012. *Location and Design Manual, Volume 2*. July.
- Ohio EPA, 2003. *Total Maximum Daily Loads for the Lower Cuyahoga River, Final Report*. September
- Ohio EPA, 2008. *Authorization for Storm Water Discharges Associated with Construction Activity Under the National Pollution Discharge Elimination System*. Ohio EPA Permit No.: OHC000003. April 21. (http://www.epa.ohio.gov/dsw/permits/GP_ConstructionSiteStormwater.aspx)
- URS Corporation, 2010. *Opportunity Corridor Step 5 Storm water Summary*. July 15.
- URS Corporation, 2011. *Opportunity Corridor Final Step 6 Storm Water Summary* dated October 4, 2011.

Figures



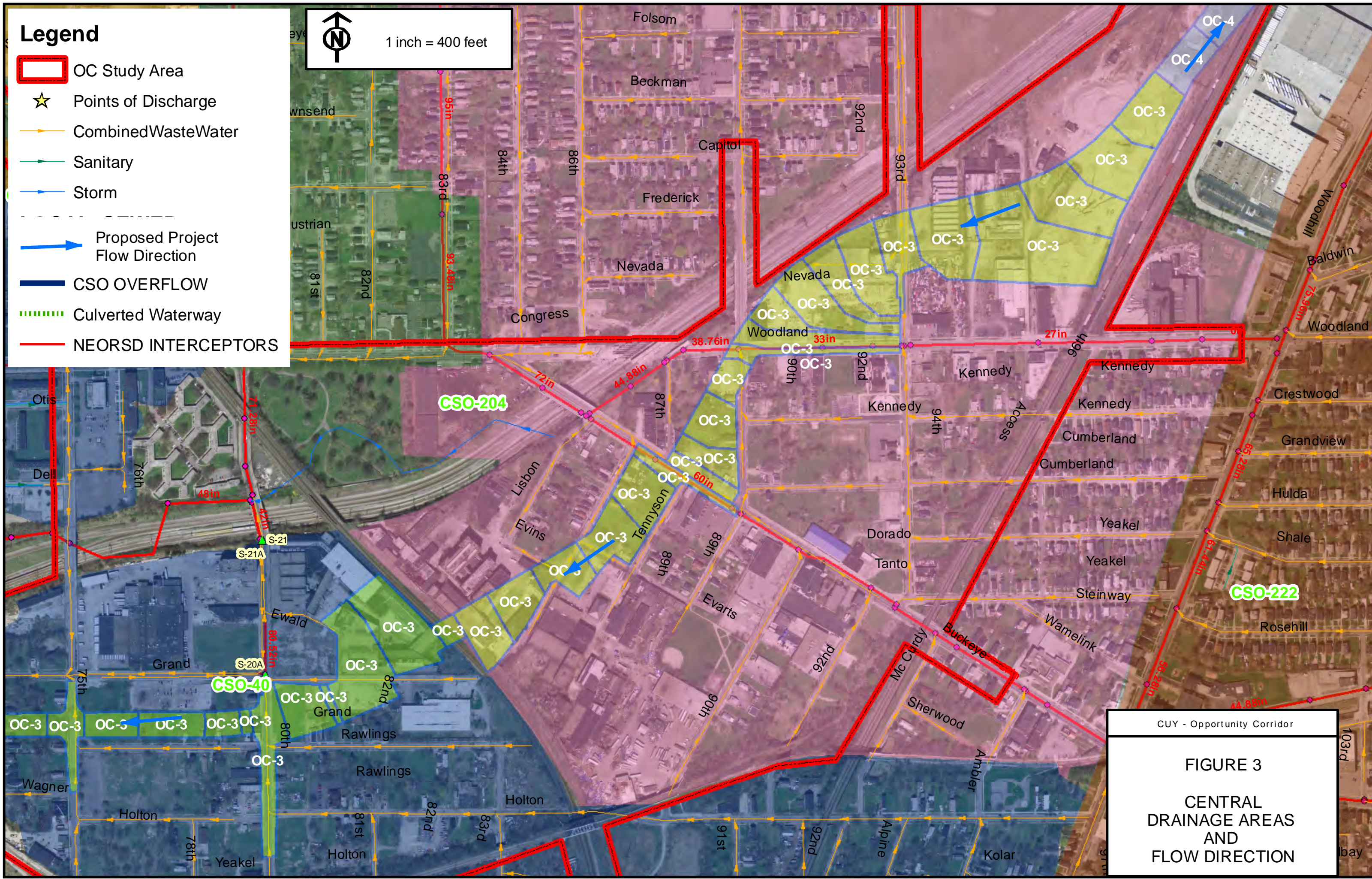


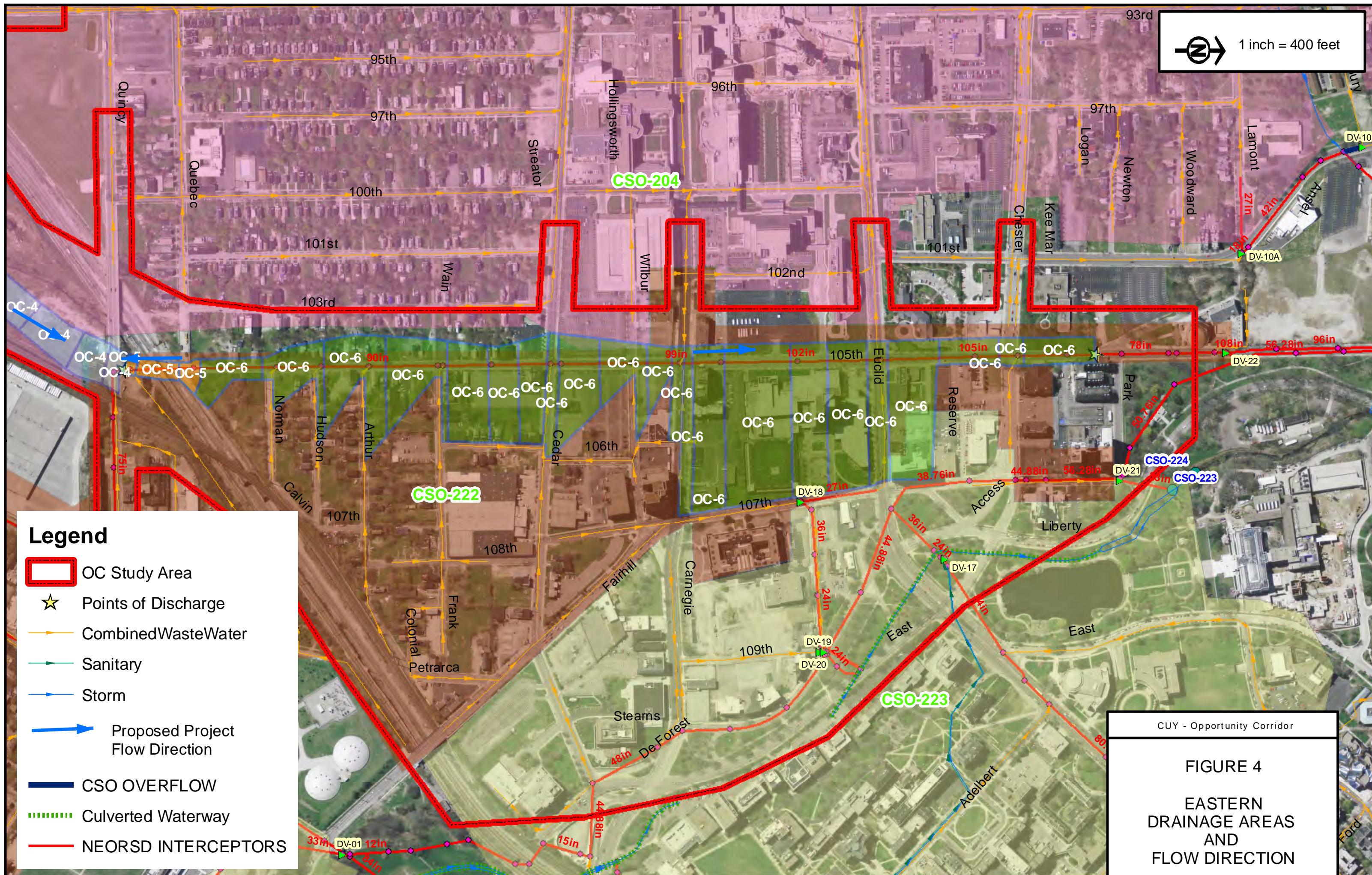
Legend

- OC Study Area
- Points of Discharge
- CombinedWasteWater
- Sanitary
- Storm
- Proposed Project Flow Direction
- CSO OVERFLOW
- Culverted Waterway
- NEORSD INTERCEPTORS














1 inch = 400 feet



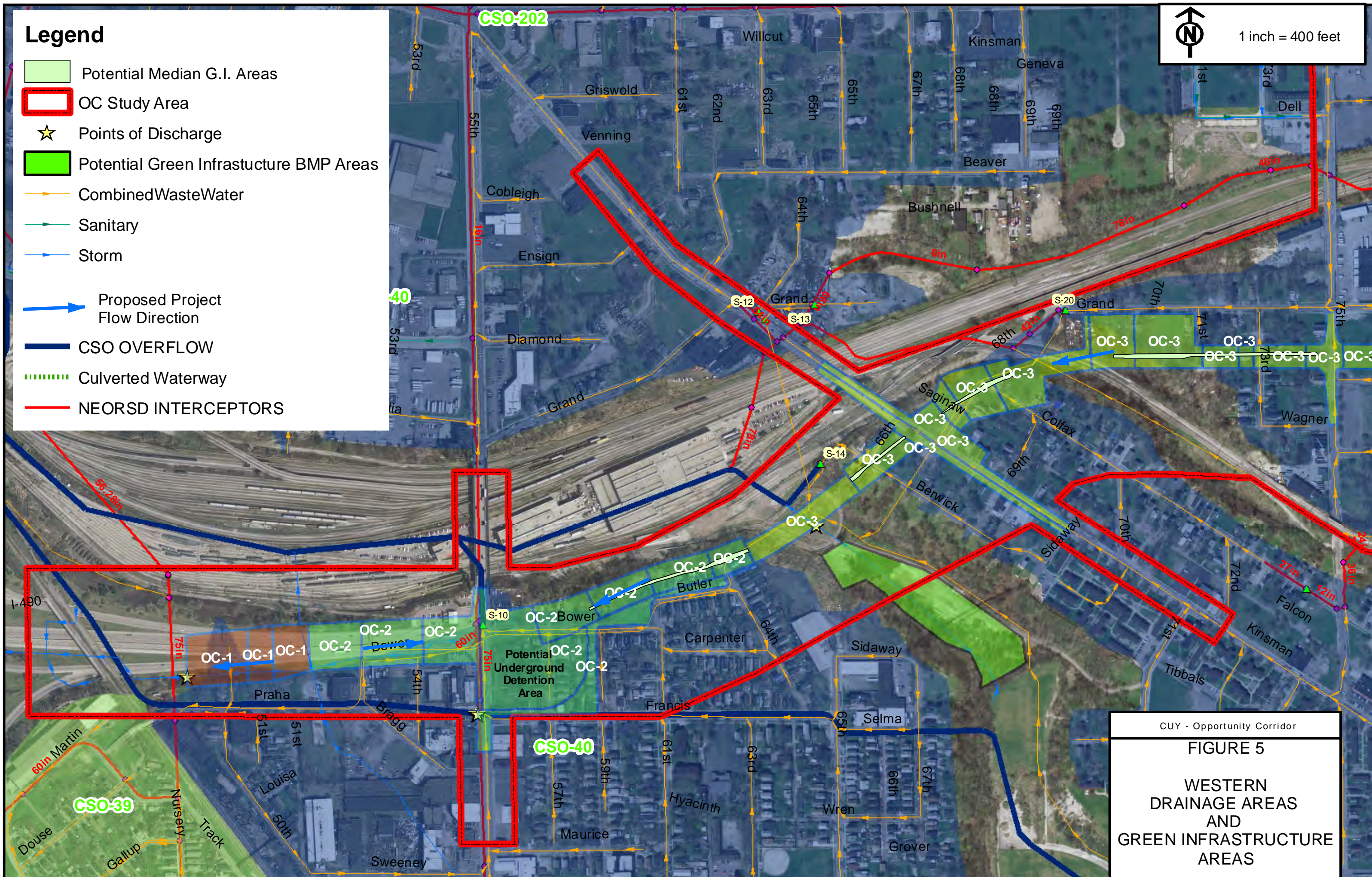


Legend

-  Potential Median G.I. Areas
-  OC Study Area
-  Points of Discharge
-  Potential Green Infrastructure BMP Areas
-  CombinedWasteWater
-  Sanitary
-  Storm
-  Proposed Project Flow Direction
-  CSO OVERFLOW
-  Culverted Waterway
-  NEORS D INTERCEPTORS



1 inch = 400 feet

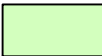












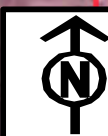
CUY - Opportunity Corridor

FIGURE 5

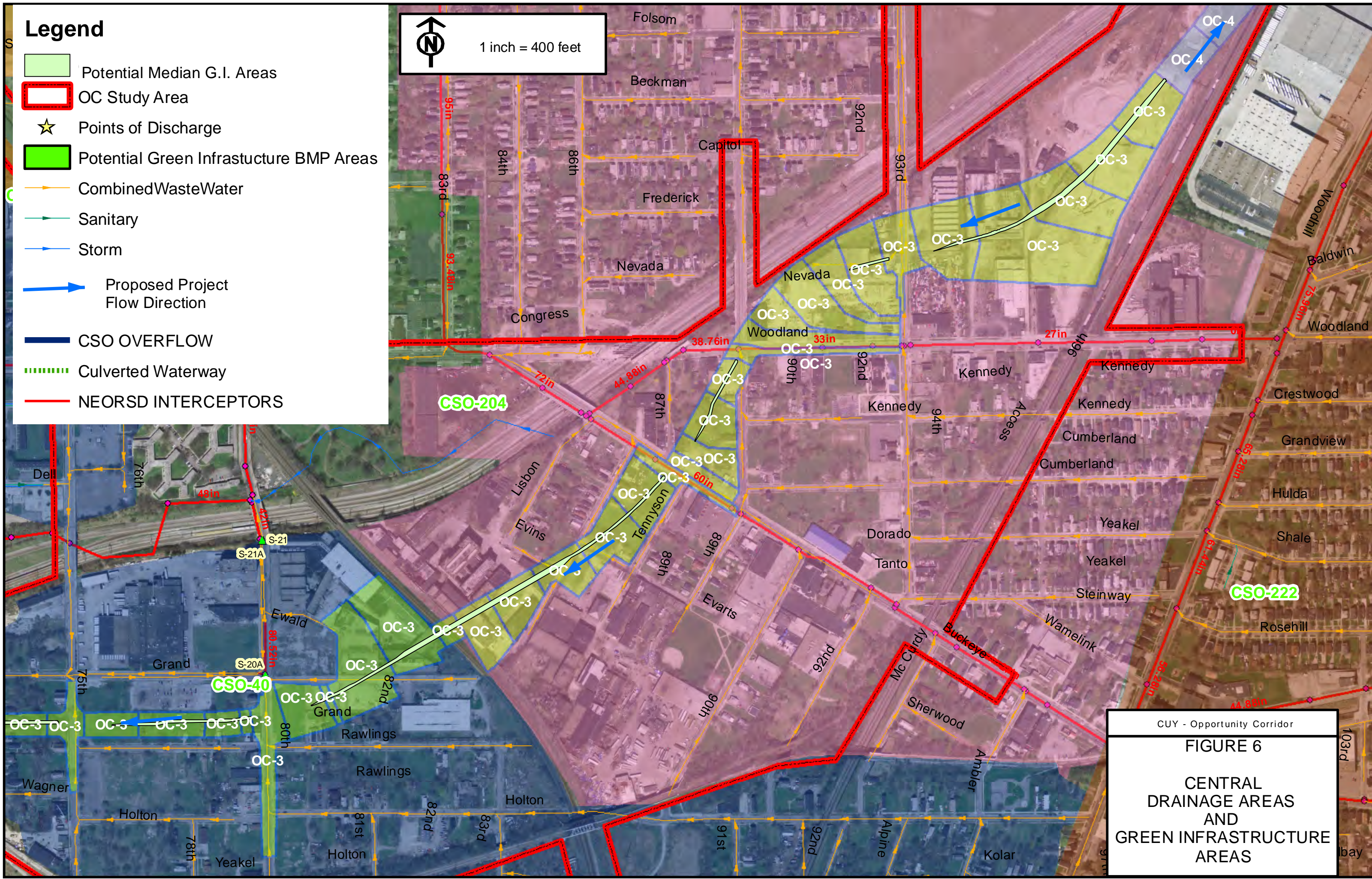
WESTERN DRAINAGE AREAS AND GREEN INFRASTRUCTURE AREAS

Legend

-
-  Potential Median G.I. Areas
 OC Study Area
 Points of Discharge
 Potential Green Infrastructure BMP Areas
 CombinedWasteWater
 Sanitary
 Storm
 Proposed Project Flow Direction
 CSO OVERFLOW
 Culverted Waterway
 NEORS D INTERCEPTORS



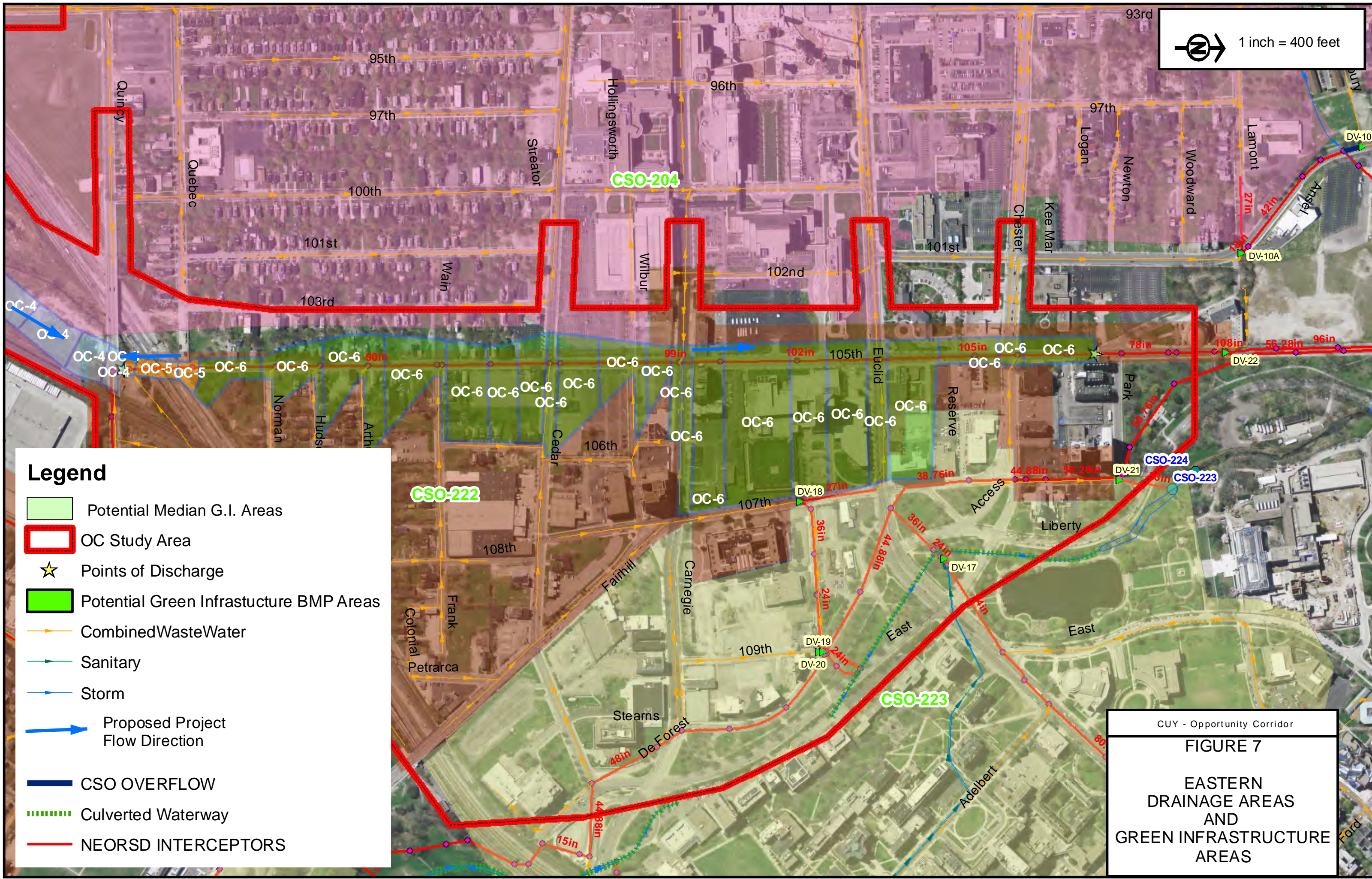
1 inch = 400 feet



CUY - Opportunity Corridor

FIGURE 6

CENTRAL DRAINAGE AREAS AND GREEN INFRASTRUCTURE AREAS



Legend

- Potential Median G.I. Areas
- OC Study Area
- Points of Discharge
- Potential Green Infrastructure BMP Areas
- CombinedWasteWater
- Sanitary
- Storm
- Proposed Project Flow Direction
- CSO OVERFLOW
- Culverted Waterway
- NEORS D INTERCEPTORS

CUY - Opportunity Corridor

FIGURE 7

EASTERN DRAINAGE AREAS AND GREEN INFRASTRUCTURE AREAS

Legend

- Drainage Areas
- OC-2 ROW
- OC-3 ROW
- OC-4 ROW
- OC-5 ROW
- OC-6 ROW
- Existing Impervious Area



1 inch = 400 feet



CUY - Opportunity Corridor

FIGURE 8

WESTERN
EXISTING IMPERVIOUS
AREAS
WITHIN ROW

Legend

- Drainage Areas
- OC-2 ROW
- OC-3 ROW
- OC-4 ROW
- OC-5 ROW
- OC-6 ROW
- Existing Impervious Area



1 inch = 400 feet



CUY - Opportunity Corridor








FIGURE 9
CENTRAL
EXISTING IMPERVIOUS
AREAS
WITHIN ROW



1 inch = 400 feet



Legend

-  Drainage Areas
-  OC-2 ROW
-  OC-3 ROW
-  OC-4 ROW
-  OC-5 ROW
-  OC-6 ROW
-  Existing Impervious Area

CUY - Opportunity Corridor

FIGURE 10
EASTERN
EXISTING IMPERVIOUS
AREAS
WITHIN ROW



Legend

- OC Study Area
- Points of Discharge
- Potential Green Infrastructure BMP Areas
- Potential Median G.I. Areas
- Sanitary
- Storm
- Proposed Project Flow Direction
- CSO OVERFLOW
- Culverted Waterway
- NEORSD INTERCEPTORS

CUY - Opportunity Corridor


FIGURE 11

**KINGSBURY RUN
GREEN INFRASTRUCTURE
AREA**



Legend

- OC Study Area
- ▲ NEORSRD_FLOW_REGULATING_STRUCTURE
- CombinedWasteWater
- Sanitary
- Storm
- NEORSRD INTERCEPTORS
- NEORSRD CSO OUTFALL

 1 inch = 100 feet

CUY - Opportunity Corridor

FIGURE 12

**105TH STREET
CSO AND STORM
ONLY SYSTEMS**

Appendix A

NEORSD Title IV Combined Sewer Code Standard Comments to All Development in Combined Sewer Area

NEORSD
Title IV Combined Sewer Code Standard Comments to all Development in Combined
Sewer Area

(Provided to URS by the NEORSD via email on January 17, 2011)

A proposed stormwater management design for the site must meet the District's Code of Regulations, Title IV - Combined Sewer Code. Title IV is applicable to any development activity in the combined sewer area. The following standards are necessary to show compliance with Title IV.

1. The District will not authorize increases in flow at combined sewer overflow (CSO) locations. Post-development peak flows shall not exceed existing condition peak flows, nor shall they result in an increase to CSO volumes and/or typical year activations. The District's preferred method to ensure this requirement is met is as follows:
 - Storm events up to the 5-year, 24-hour event: The designer shall demonstrate to the District's satisfaction that storage volume shall be provided based on the 5-year event using a maximum release rate of the 6-month, 24-hour existing conditions peak discharge for connections to the combined sewer system.
 - Storm events greater than the 5-year and up to the 25-year, 24-hour event: The maximum release rate shall be defined as the existing conditions peak discharge of the corresponding storm frequency evaluated for post-development conditions.

The designer shall demonstrate to the District's satisfaction that post-development peak flows will not exceed pre-development peak flows and that proposed post-development peak flows will not create increases in flow at CSO locations. Designers shall submit a summary of existing and post-development discharge locations and flows, and any corresponding impacts the new discharge locations and/or flows have on CSO flows up to the 25-year design event.

The NEORSD reserves the right to require additional peak rate and/or volume controls. A more restrictive allowable discharge rate than that stated above may be required due to downstream capacity issues and/or to ensure no increases in flow at specific CSO locations. The designer is encouraged to contact the District early in the project development to verify if the project is located in a critical CSO area and will be required to meet more restrictive criteria.

2. For connections to the combined sewer system, stormwater shall be managed in accordance to Part III.G.2.e of the Ohio EPA's General Permit

OHC000003 or Chapter 3116 of the City of Cleveland's Codified Ordinances, whichever is more restrictive.

3. For separated storm connections to a CSO pipe or receiving water, the District will only accept stormwater control measures that provide water quality treatment for 100% of the project area whether the project is defined as a redevelopment project or new development.

4. A Long-Term Operation and Maintenance Plan shall be managed in accordance to Part III.G.2.e of the Ohio EPA's General Permit OHC000003 and shall include the proposed schedule for the perpetual maintenance of the complete storm drainage system. This plan shall indicate who will be responsible (i.e. municipality, landowner, or association) for this operation and maintenance and the legally binding mechanism which ensures perpetual funding. If there is a maintenance agreement with the City of Cleveland or other applicable local government, a copy of the agreement must be submitted to the District. Approval of the Long Term Operation and Maintenance Plan by the District is necessary prior to plan approval.

5. Stormwater runoff impacts to the local collection system capacity need to be considered. The local community shall be engaged as necessary on this item. Projects in the City of Cleveland shall contact the City of Cleveland's Water Pollution Control (WPC).

Appendix B

City of Cleveland

Chapter 3116 — Construction and Post-Construction Site Storm Water Runoff Control

The following text was copied on 8/4/2011 from the following webpage:
http://caselaw.lp.findlaw.com/clevelandcodes/cco_part3_3116.html.

PART THREE — BUILDING CODE

Title XIII — Building Code

Chapter 3116 — Construction and Post-Construction Site Storm Water Runoff Control

Complete to December 31, 2010

CROSS REFERENCES

Construction and demolition debris, RC Ch 3714

3116.01 Definitions

The definitions contained in Ohio Environmental Protection Agency (“Ohio EPA”) General Permit Number “OHC000003”, entitled “Authorization for Storm Water Discharges Associated With Construction Activity under the National Pollutant Discharge Elimination System” in effect at the time a permit is applied for under this Chapter shall apply to this Chapter, except the following definitions shall apply:

(a) “Construction activity” for purposes of this chapter, means any clearing, grading, excavating, grubbing, trench dewatering, and/or filling activities that disturb one or more acres of land. The threshold acreage includes the entire area disturbed in the larger common plan of development or sale.

(b) “Director” means the Director of Building and Housing or his designee.

(c) “Ohio EPA Permit No. OHC000003” means the Ohio EPA's National Pollutant Discharge Elimination System construction general permit number OHC000003, effective April 21, 2008 and any subsequent generations of that permit issued by the Ohio EPA.

(d) “Person” means any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, or any other legal entity. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.02 General Provisions

(a) *Lands to Which This Chapter Applies.* This chapter shall apply to all areas of the City of Cleveland.

(b) *Discharges to Which This Chapter Applies.* This chapter shall apply to all new and existing discharges composed of storm water associated with construction activity that enters surface waters of the State, or a storm drain leading to surface waters of the State, or to a public sewer drain. Discharges of materials not composed entirely of storm water, including but not limited to materials containing discarded building materials, concrete truck washout, chemicals, litter, or sanitary waste, must comply with all other applicable laws and regulations.

(c) *Conflict with Other Regulations.* This chapter is intended to be supplemental to any city regulation, or policy governing the development of land, the removal of soil, other land-disturbing activity. The most restrictive standards imposed by any city ordinance, regulation, or policy shall apply. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.03 Permit Required

(a) It shall be unlawful for any person to undertake any construction activity without first obtaining a permit from the Director.

(b) It shall be unlawful for any permittee to fail to comply with their permit. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.04 Plan Review, Inspections and Record Keeping; Contract Authority

The Director of Building and Housing is authorized to enter into contracts for professional services necessary to provide training, and to assist with plan review, inspections, and record-keeping, as needed to administer this chapter.

The compensation to be paid for such services shall be fixed by the Board of Control. Professional services contracts authorized by this section shall be prepared by the Director of Law, approved by the Director of Building and Housing, certified by the Director of Finance, and paid from the annual appropriations made for such purpose. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.05 Permit Application; Fee

(a) The Director may charge a permit application fee as established from time to time by the Board of Control.

(b) Any person desiring a permit required by this chapter shall file an application with the Director. The application shall consist of:

(1) The permit application fee;

(2) Two (2) or more copies of a Storm Water Pollution Prevention Plan (SWP3) prepared in accordance with sound engineering and/or conservation practices by a professional experienced in the design and implementation of standard erosion and sediment controls and storm water management practices addressing all phases of construction. The SWP3 is not complete unless it contains the information, including but not limited to the post-construction operation and maintenance plans, required in Ohio EPA Permit No. OHC000003 Part 3 "Storm Water Pollution Prevention Plan (SWP3)". (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.06 Approval or Disapproval of Storm Water Pollution Prevention Plan

(a) The Director shall review storm water pollution prevention plans submitted to him and grant written approval if he or she determines that the plan meets the requirements prescribed in Ohio EPA Permit No. OHC000003 and this chapter.

(b) When a plan is determined to be inadequate, written notice of disapproval stating the specific reasons for disapproval shall be communicated to the applicant. The notice shall specify the modifications, terms and conditions that are necessary for approval of the plan. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.07 Issuance of Permit; Appeal

(a) The Director shall issue a permit approving construction activity under this chapter on approval of the SWP3.

(b) Any denial of a permit under the provisions of this Chapter may be appealed to the Board of Building Standards and Building Appeals as provided in the Charter and in Section 3103.20. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.08 Periodic Inspections of Construction Activities

(a) The Director may make periodic inspections of construction activities or land-disturbing activities to ensure compliance with this chapter. The right of inspection shall be inherent in the issuance of the permit under this chapter.

(b) All applicable permits and approved SWP3s under this chapter shall be made immediately available on site upon request of the Director or his/her authorized representative during working hours. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.09 Amendment of Approved Plan

A SWP3 approved under this chapter may be amended by the Director in the following cases:

(a) Where inspection reveals that the plan is inadequate to satisfy applicable regulatory provisions; or

(b) Where the person responsible for carrying out the approved plan finds that because of changed circumstances or for other reasons the approved plan cannot be effectively carried out, and the person proposes amendments to the plan consistent with the requirements of this chapter. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.10 Final Inspection, Certificate of Completion of Construction Activities and Post Construction Management

(a) Persons obtaining a permit under this chapter must continue to meet the applicable requirements of Ohio EPA Permit No. OHC000003 and this chapter until they receive, upon written request, a certificate of completion issued by the Director. A certificate of completion may be issued on finding satisfactory evidence of compliance with the approved SWP3 and the achievement of adequate stabilization. "Adequate stabilization" of the site shall be determined by the Director.

(b) The permittee, or any person identified in an approved SWP3 as responsible for the continuing obligations for the maintenance of post-construction best management practices, shall not be relieved of those continuing obligations once coverage under a permit is terminated or by the issuance of a certificate of completion.

(c) The permittee must provide copies of all post construction best management practices ("BMPs") described in the approved SWP3 to the post-construction operator of the site (including homeowner associations) and land owners, upon completion of construction activities prior to termination of permit coverage.

(d) The post-construction operator of the site and the owner of the premises subject to the provisions of this Building Code shall continue to be responsible for maintenance and compliance with the post-construction storm water BMPs described in the approved SWP3.

(e) A violation of a provision in this section requiring compliance with a post-construction BMPs is a violation of this chapter. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.11 Periodic and Final Inspection Fees

The Director is authorized to charge fees for periodic or final inspections according to an inspection fee schedule fixed from time to time by the Board of Control. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.12 Waivers

The Director may waive or modify any of the regulations that are deemed inappropriate or too restrictive on the applicant's proof of compliance with the waiver conditions contained in the Ohio EPA Permit No. "OHC000003", in effect at the time a permit is applied for under this chapter. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

3116.13 Severability

If any portion of this chapter, or any section or part of a section shall be declared by a court of competent jurisdiction to be invalid, the declaration shall be limited solely to that portion, section, or part of a section that was directly involved in the controversy before the court on which judgment was rendered and shall not affect or impair the validity of the remainder of the chapter. (Ord. No. 807-09. Passed 7-1-09, eff. 7-8-09)

Appendix C

ODOT Water Quality Calculations

Treatment Percent - Based on Each Drainage Area				
Drainage Area #	Ex. Impervious Area Aix (Acres)	New Impervious Area Ain (Acres)	Total Impervious Area Aix + Ain	T% (decimal)
OC-2	10.82	4.38	15.20	0.43
OC-3	33.86	18.34	52.20	0.48
OC-4	0.60	1.81	2.41	0.80
OC-5	0.48	0.10	0.58	0.34

Treatment Percent - Based on Each Drainage Area

Drainage Area #	Total Contributing Drainage Area (Acres)	Existing Impervious Area (Acres)	i	Cq	ODOT WQv (ac-ft)	ODOT WQv (cf)	T% (decimal)	Final ODOT Project WQv (ac-ft)	Final ODOT Project WQv (cf)
OC-2	15.28	10.82	0.71	0.5	0.49	21,163	0.43	0.21	9,100
OC-3	58.88	33.86	0.58	0.4	1.45	63,179	0.48	0.70	30,326
OC-4	3.41	0.60	0.18	0.2	0.03	1,456	0.80	0.03	1,165
OC-5	0.53	0.48	0.91	0.8	0.02	1,087	0.34	0.01	370
OC-6	42.22	34.21	0.81	0.6	1.64	71,510	0.20	0.33	14,302

ODOT Water Quality Volume for Median Areas

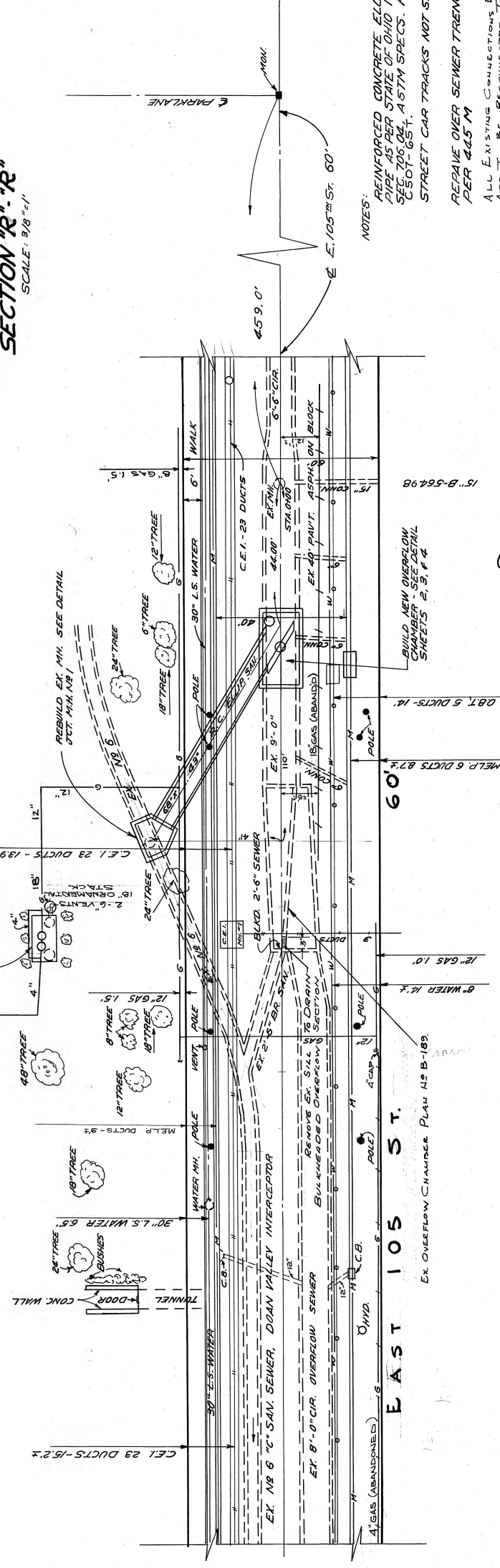
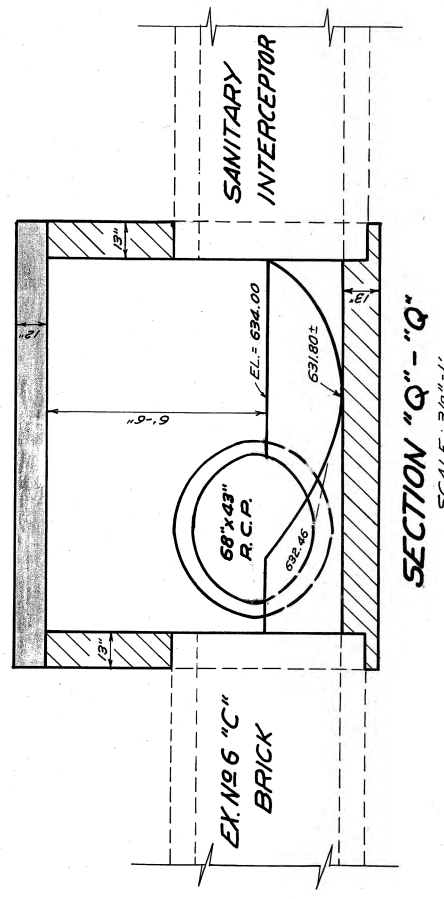
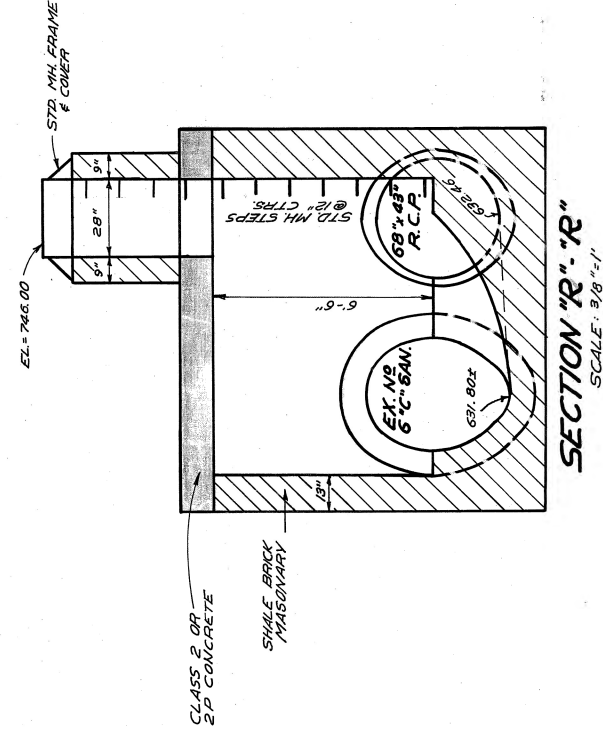
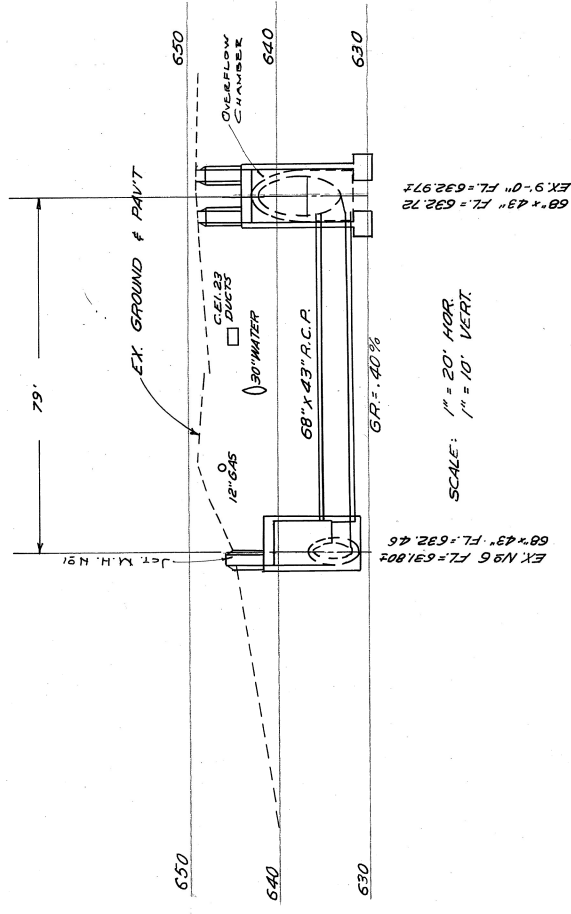
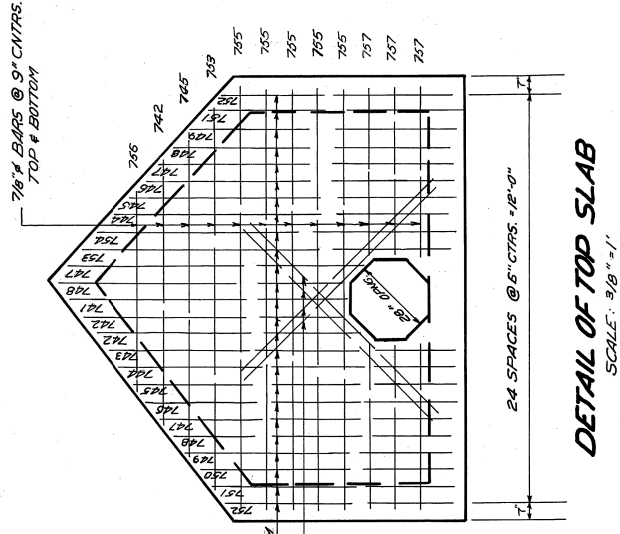
Drainage Area #	Total Contributing Drainage Area (Acres)	Impervious Area (Acres)	i	Cq	ODOT WQv (ac-ft)	ODOT WQv (cf)	T% (decimal)	Final ODOT Project WQv (ac-ft)	Final ODOT Project WQv (cf)
OC-2	0.80	0.76	0.95	0.8	0.04	1,795	0.43	0.02	772
OC-3	7.30	6.30	0.86	0.7	0.32	13,741	0.48	0.15	6,596

ODOT Water Quality Volume for G.I. Areas

Drainage Area #	Total Contributing Drainage Area (Acres)	Impervious Area (Acres)	i	Cq	ODOT WQv (ac-ft)	ODOT WQv (cf)	T% (decimal)	Final ODOT Project WQv (ac-ft)	Final ODOT Project WQv (cf)
OC-2	14.48	10.06	0.69	0.5	0.45	19,541	0.43	0.19	8,402
OC-3	51.58	27.56	0.53	0.4	1.18	51,229	0.48	0.56	24,590
OC-4	3.41	0.60	0.18	0.2	0.03	1,456	0.80	0.03	1,165
OC-5	0.53	0.48	0.91	0.8	0.02	1,087	0.34	0.01	370
OC-6	42.22	34.21	0.81	0.6	1.64	71,510	0.20	0.33	14,302

Appendix D

East 105th Street CSO System Plans



M/K	SIZE	DETAIL	APP LGTH REQD	NO
741	7/8"	STRAIGHT	8'-2"	2
742	"	"	7'-9"	6
743	"	"	10'-4"	2
744	"	"	10'-2"	6
745	"	"	9'-2"	4
746	"	"	9'-2"	4
747	"	"	8'-10"	6
748	"	"	8'-9"	4
749	"	"	8'-0"	12
750	"	"	7'-7"	2
751	"	"	7'-3"	4
752	"	"	6'-11"	4
753	"	"	11'-2"	2
754	"	"	10'-7"	2
755	"	"	12'-10"	10
756	"	"	5'-10"	2
757	"	"	5'-0"	12
758	"	"	2'-0"	14

APPROVED Robert L. Newman 9-14-66

COMM. OF PASSES DATE

NOTE: CORRECTNESS OF UNDERGROUND INFORMATION HEREON SHOWN IS NOT GUARANTEED, AND MUST BE USED AT THE BIDDERS OWN RISK.

CITY OF CLEVELAND
ROBERT J. KELLY, CHIEF OF PUBLIC SERVICE
ENGINEERING DIVISION
PLAN FOR AN OVERFLOW CHAMBER

IN

EAST 105TH STREET
503' ± NORTH OF PARK LANE

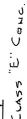
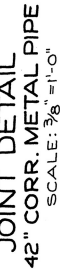
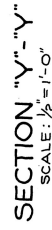
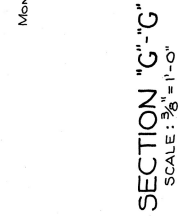
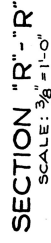
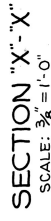
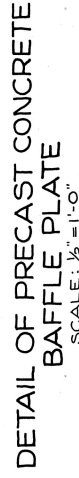
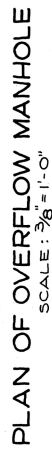
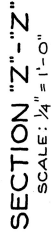
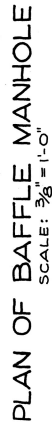
SCALLS		HOW	DRAFTSMAN	DATE	CONST. PLANS APPROVED BY	DATE
		VERT.	LEG. H. POHLER	5/29/60	CONST. CHAIRMAN	
ENG. OF SEWER REG.	DATE		ENG. OF SEWER REG.	DATE		
CHIEF DRAFTSMAN	DATE		CHIEF DRAFTSMAN	DATE		
ASST. CHIEF OF ENCL.	DATE		ASST. CHIEF OF ENCL.	DATE		
SUBMITTAL	DATE		SUBMITTAL	DATE		
REVISION	DATE		REVISION	DATE		

COMM. OF ENCL.

DATE

FILE NO. **A-962**

NOTES:
REINFORCED CONCRETE ELLIPTICAL
PIPE 45 PER STATE OF OHIO 1965 SPECS
SEC. 706.04, A STM SPECS. HE-CLASS-III,
C50T-65T.
STREET CAR TRACKS NOT SHOWN
REPAIRE OVER SEWER TRENCH 45
PER 445 M
ALL EXISTING CONNECTIONS ENCOUNTERED
ARE TO BE RECONNECTED TO THE
EXISTING SEWER.



NOTE CORRECTNESS OF UNDERGROUND INFORMATION HEREON SHOWN IS NOT GUARANTEED, AND MUST BE USED AT THE BIDDERS OWN RISK

CITY OF CLEVELAND
ROBERT J. KELLY
 DIRECTOR OF PUBLIC SERVICE
 ENGINEERING DIVISION
 PLAN FOR A SEWER IN
ANSEL RD. RELOCATED 60'
 BETWEEN
 E. 191ST ST. & HOUGH AVE

SCALE	VERT. 30°	DRAFTSMAN	DATE	CONSTR. DATE	DATE
			5/31/67	5/31/67	5/25/67
LEG. PLANS APPROVED BY		CONSTR. PLANS APPROVED BY			
		<i>Handwritten signature</i> 5/31/67			
SEWER DESIGN	DATE	SEWER DESIGN	DATE		
ENG. OF DESIGN	DATE	ENG. OF DESIGN	DATE		
ASST. COMM. OF ENG.	DATE	ASST. COMM. OF ENG.	DATE		
SIGNATURE	DATE	APPROVED	DATE	COMM. OF ENG.	DATE
REVISION			COMM. OF ENG.	DATE	
<i>Handwritten signature</i>			FILE NO.	A-967	
			DATE		